Remarks

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version With Markings to Show Changes Made**."

Respectfully submitted,

Jacqueline E. Hartt
Jacqueline E. Hartt, Ph.D.
Reg. No. 37,845
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A.
255 South Orange Avenue, Suite 1401
P.O. Box 3791
Orlando, Florida 32802
(407) 841-2330
Agent for Applicant

CERTIFICATE OF MAILING

I hereby certify that the foregoing is being deposited with the United States Postal Service as first class mail in an envelope addressed to the Assistant Commissioner of Patents, Washington D.C. 20231, this 16TH day of January, 2002.

Edward Bradley
Edward Bradley

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please replace the paragraph beginning on page 5, line 15, and insert the following paragraph:

In carrying out this technique, the pattern constitutes overlapping but not coaxial locations for ablation to occur with each pulse removing a microvolume of material by ablation or erosion. For different depths, a pattern is repeated over those areas where increased ablation is needed. The laser pulses are usually at a certain pulse repetition rate. The subsequent pulses in a sequence are spaced at least one pulse beam width from the previous pulse and at a distance the ablated particles will not[-] substantially interfere with the subsequent pulse. In order to maximize the speed of the ablation, the subsequent pulse is spaced sufficiently close to enable the beam to be moved to the successive location within the time of the pulse repetition. The ablation is carried out on an object until a desired specific shape is achieved.

Please replace the paragraph beginning on page 6, line 20 with the following:

Referring now to the drawings, and more particularly to FIG. 1, a block diagram is shown of a laser beam delivery and eye tracking system referenced generally by the numeral 5. The laser beam delivery portion of system 5 includes treatment laser source 500, projection optics 510, X-Y translation mirror optics 520, beam translation controller 530, dichroic beamsplitter 200, and beam angle adjustment mirror optics 300. By way of example, it will be assumed that treatment laser 500 is a 193 nanometer wavelength excimer laser used in an ophthalmic PRK (or PTK) procedure performed on a movable

workpiece, e.g., eye 10. However, it is to be understood that the method and system of the present invention will apply equally as well to movable workpieces other than an eye, and further to other wavelength surface treatment or surface eroding lasers. The laser pulses are distributed as shots over the area to be ablated or eroded, preferably in a distributed sequence. A single laser pulse of sufficient power to cause ablation creates a micro cloud of ablated particles which [.]interferes with the next laser pulse if located in the same or immediate point. To avoid this interference, the next laser pulse is spatially distributed to a next point of erosion or ablation that is located a sufficient distance so as to avoid the cloud of ablated particles. Once the cloud is dissipated, another laser pulse is made adjacent the area [prior] being eroded so that after the pattern of shots is completed the cumulative shots fill in and complete said pattern so that the desired shape of the object or cornea is achieved.

Please replace the paragraph beginning on page 7, line 17 with the following:

In operation of the beam delivery portion of system 5, laser source 500 produces laser beam 502 which is incident upon projection optics 510. Projection optics 510 adjusts the diameter and distance to focus of beam 502 depending on the requirements of the particular procedure being performed. For the illustrative example of an excimer laser used in the PRK or PTK procedure, projection optics 510 includes planar concave lens 512, and fixed focus lenses 514 and 516 as shown in the sectional view of FIG. 2. Lenses 512 and 514 act together to form an [A-focal] afocal telescope that expands the diameter of beam 502. Fixed focus lens 516 focuses the expanded beam 502 at the workpiece, i.e., eye 10,

and provides sufficient depth, indicated by arrow 518, in the plane of focus of lens 516. This provides flexibility in the placement of projection optics 510 relative to the surface of the workpiece. An alternative implementation is to eliminate lens 514 when less flexibility can be tolerated.

Please replace the paragraph on page 10, line 4 as follows:

Beam angle adjustment mirror optics consists of independently rotating mirrors 310 and 320. Mirror 310 is rotatable about axis 312 as indicated by arrow 314 while mirror 320 is rotatable about axis 322 as indicated by arrow 324. Axes 312 [end] <u>and</u> 322 are orthogonal to one another. In this way, mirror 310 is capable of sweeping light energy 101-T and beam 502 in a first plane (e.g., elevation) while mirror 320 is[-] capable of independently sweeping light energy 101-T[-] and beam 502 in a second plane (e.g., azimuth) that is perpendicular to the first plane. Upon exiting beam angle adjustment mirror optics 300, light energy 101-T and beam 502 impinge on eye 10.

Please replace the paragraph on page 12, beginning line 8 as follows:

A preferred embodiment method for determining the amount of eye movement, as well as eye movement sensor 100 for carrying out such a method, are described in detail in the aforementioned copending patent application. However, for purpose of a complete description, sensor 100 will be described briefly with the aid of the block diagram shown in FIG. [2] <u>5</u>. Sensor 100 may be broken down into a delivery portion and a receiving portion. Essentially, the delivery portion projects light energy 101-T in the form of light

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spots 21, 22, 23 and 24 onto a boundary (e.g., iris/pupil boundary 14) on the surface of eye 10. The receiving portion monitors light energy 101-R in the form of reflections caused by light spots 21, 22, 23 and 24.

Please replace the paragraph beginning on page 12, line 17 as follows:

In delivery, spots 21 and 23 are focused and positioned on axis 25 while spots 22 and 24 are focused and positioned on axis 26 as shown. Axes 25 and 26 are orthogonal to one another. [Spots 21, 22, 23 and 24 are focused to be incident on and evenly spaced about iris/pupil boundary 14.] The four spots 21, 22, 23 and 24 are of equal energy and are spaced evenly about and on iris/pupil boundary 14. This placement provides for two-axis motion sensing in the following manner. Each light spot 21, 22, 23 and 24 causes a certain amount of reflection at its position on iris/pupil boundary 14. Since boundary 14 moves in coincidence with eye movement, the amount of reflection from light spots 21, 22, 23 and 24 changes in accordance with eye movement. By spacing the four spots evenly about the circular boundary geometry, horizontal or vertical eye movement is detected by changes in the amount of reflection from adjacent pairs of spots. For example, horizontal eye movement is monitored by comparing the combined reflection from light spots 21 and 24 with the combined reflection from light spots 22 and 23. In a similar fashion, vertical eye movement is monitored by comparing the combined reflection from light spots 21 and 22 with the combined reflection from light spots 23 and 24.

Please replace the paragraph beginning on page 14, line 19 as follows:

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The receiving portion first directs the vertical component of the reflected light as indicated by arrow 152. Thus, cube 140 serves to separate the transmitted light energy from the reflected light energy for accurate measurement. The vertically polarized portion of the reflection from spots 21, 22, 23 and 24, is passed through focusing lens 154 for imaging onto an infrared detector 156.[-] Detector 156 passes its signal to a multiplexing peak detecting circuit 158 which is essentially a plurality of peak sample and hold circuits, a variety of which are well known in the art. Circuit 158 is configured to sample (and hold the peak value from) detector 156 in accordance with the pulse repetition frequency of laser 102 and the delay x. For example, if the pulse repetition frequency of laser 102 is 4 kHz, circuit 158 gathers reflections from spots 21, 22, 23 and 24 every 250 microseconds.

Please replace the paragraph beginning on page 16, line 1 as follows:

Note that normalizing (i.e., dividing by $R_{21} + R_{22} + R_{23} + R_{24}$) reduces the effects of variations in['] signal strength. Once determined, the measured amounts of eye movement are sent to beam angle adjustment mirror optics 300.

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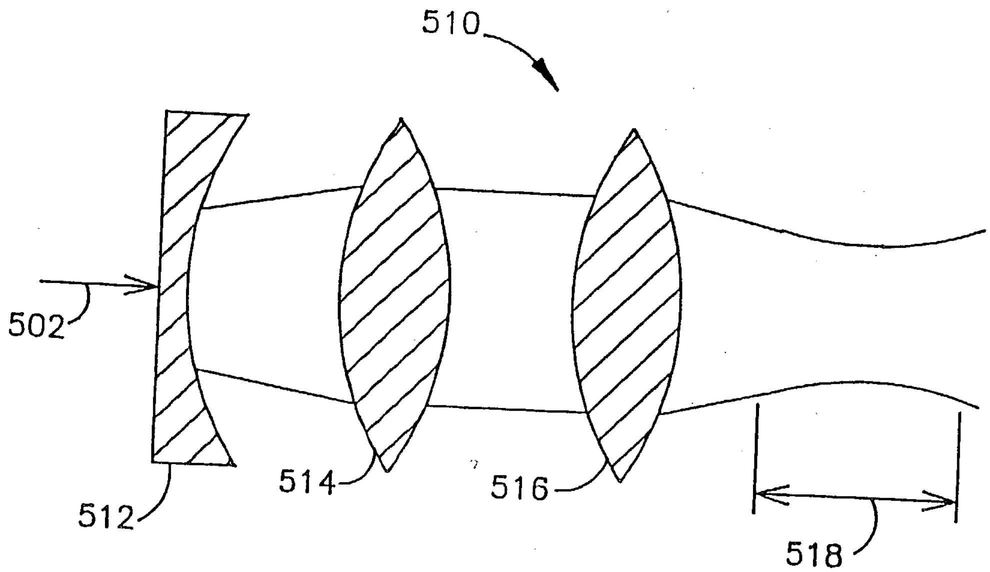

FIG. 2

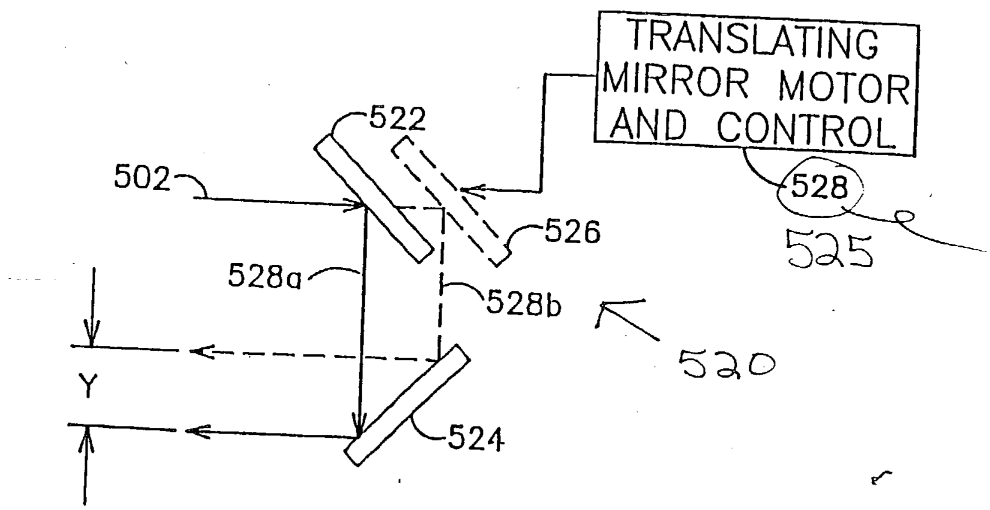

FIG. 3 (Amended)